

***Population Dynamics, Carrying Capacity, and Conservation Biology***

**G. Tyler Miller's  
Living in the Environment  
12<sup>th</sup> Edition**

***Chapter 9***

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***Key Concepts***

- Factors affecting population size
- Species reproductive patterns
- Species survivorship patterns
- Conservation biology and human impacts on ecosystems

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***Population Dynamics and Carrying Capacity***

- Population dynamics
- Zero population growth (ZPG)
- Biotic potential (intrinsic rate of increase  $[r]$ )
- Environmental resistance
- Carrying capacity
- Minimum viable population (MVP)

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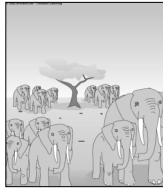
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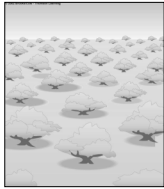
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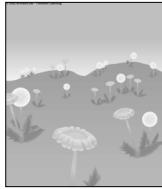
## Population Dispersion



Clumped  
(elephants)



Uniform  
(creosote bush)



Random  
(dandelions)

Fig. 9.2, p. 199

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## Factors Affecting Population Size

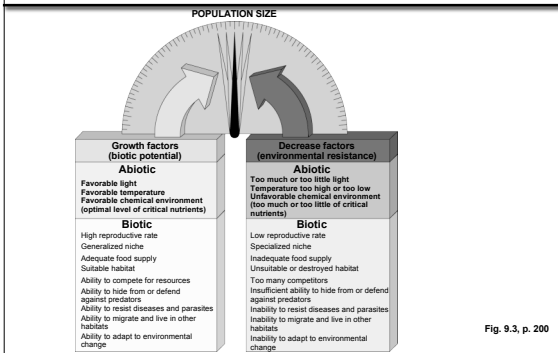


Fig. 9.3, p. 200

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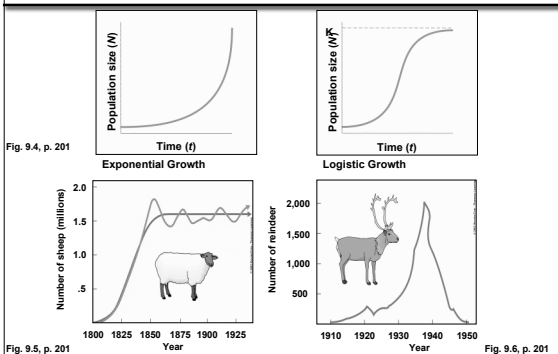
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## Exponential and Logistic Growth




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## Population Density Effects

- Density-independent controls
- Density-dependent controls

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## Natural Population Curves

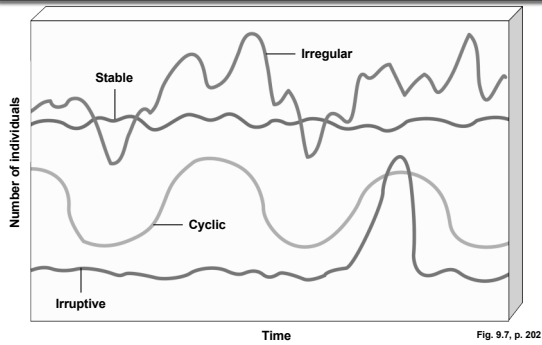


Fig. 9.7, p. 202

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## The Role of Predation in Controlling Population Size

- Predator-prey cycles
- Top-down control
- Bottom-up control

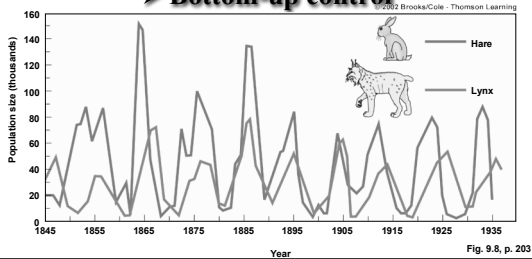


Fig. 9.8, p. 203

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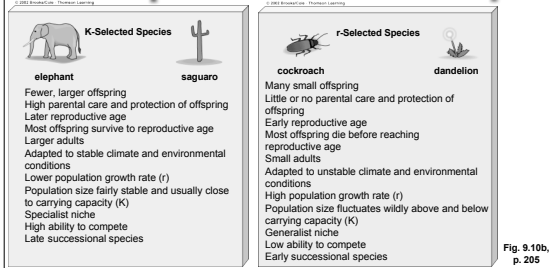
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## Reproductive Patterns and Survival

➤ Asexual reproduction ➤ r-selected species

➤ Sexual reproduction ➤ K-selected species




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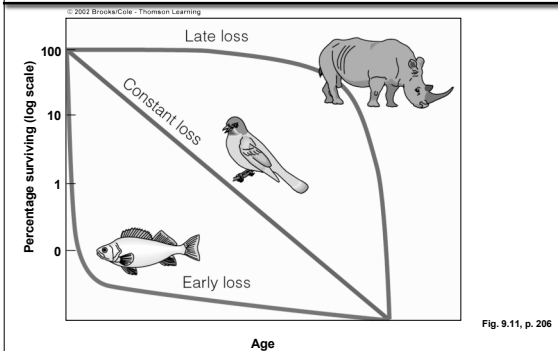
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## Survivorship Curves




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## Conservation Biology: Sustaining Wildlife Populations

- Investigate human impacts on biodiversity
- Ideas for maintaining biodiversity
- Endangered species management
- Wildlife reserves and ecological restoration
- Ecological economics
- Environmental ethics
- Wildlife management

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### ***Human Impacts on Ecosystems***

- **Habitat degradation and fragmentation**
- **Ecosystem simplification**
- **Genetic resistance**
- **Predator elimination**
- **Introduction of non-native species**
- **Overharvesting renewable resources**
- **Interference with ecological systems**

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### ***Learning from Nature***

- **Interdependence**
- **Diversity**
- **Resilience**      **See Connections p. 208**
- **Adaptability**
- **Unpredictability**
- **Limits**

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